DOCKET NO: 240720US26YA

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF	:
JOHN A HUGHES, ET AL.	: EXAMINER: MAUREEN GRAMACLIA
SERIAL NO: 10/673,376	:
FILED: SEPTEMBER 30, 2003	: GROUP ART UNIT: 1716
FOR: METHOD AND SYSTEM FOR INTRODUCTION OF AN ACTIVE MATERIAL TO A CHEMICAL PROCESS	:

REPLY BRIEF UNDER 37 C.F.R. § 41.41

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

This is a reply brief in response to the Examiner's Answer mailed August 12, 2010.

TABLE OF CONTENTS

I. Status of Claims 3

II. Grounds of Rejection to be Reviewed on Appeal 4

III. Arguments 5

A. The Examiner's Answer wrongly concludes that Hasegawa et al teach a focus ring that erodes when exposed to plasma 5

B. The Examiner's Answer incorrectly decides what the combined teachings of Hasegawa et al and Kumar et al would have a reasonable expectation of success 6

C. The Examiner's Answer has still provided no evidence to show that the erodible polymeric component of the combination of Hasegawa et al and Kumar et al would provide a benefit which would be expected to offset any corresponding loss in the active species used to etch the passive polymer to release the active component 8

D. The Examiner's Answer ignores Kava et al as rebuttal evidence 10

IV. Conclusion 12

I. Status of Claims

Claims 1, 3, 11, 18, 20, 22, and 40-43 are presently active. Claims 2, 4-10, 12-17, 19, 21, and 23-26 are withdrawn. Claims 27-39 were canceled without prejudice. Claims 1, 3, 11, 18, 20, 22, and 40-43 are appealed.

II. Grounds of Rejection to be Reviewed on Appeal

Claims 1, 3, 11, 18, 20, 22, and 40-43 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,556,500 to Hasegawa et al in view of Kumar et al (U.S. Patent No. 7,227,097)

III. Arguments

A. The Examiner's Answer wrongly concludes that Hasegawa et al teach a focus ring that erodes when exposed to plasma

The Examiner's Answer seems to equate Hasegawa et al's teaching of "causes such a reaction product as to be substantially adsorbed" with"forms a reaction product" when it asserts that a material that forms a reaction product is an erodible passive material. The Examiner's Answer cites to col. 9, lines 36-47, and col. 10, line 65, to col. 11, line 2, of Hasegawa et al.

Yet, those sections reproduced below nowhere describe that the components of the focus rings described therein erode. As emphasized below, the inner part of the focus ring of Hasegawa et al causes substantially no reaction product by contact with an etching gas, and the outer part of the focus ring of Hasegawa et al causes such a reaction product as to be substantially adsorbed on the etching target by contact with an etching gas.

Col. 9, lines 36-47, states:

> As has been described above, the in-plane uniformity of etching characteristics such as etching rate and etching anisotropy can be improved by employing the focus ring 102 comprising a compound structure of inner and outer parts 104 and 106 and selecting the specific materials of the inner and outer parts. The ***inner part*** is formed of an electrically conductive material, e.g. amorphous carbon, which ***causes substantially no reaction product by contact with an etching gas***, or an electrically conductive material which does not cause, at least, any reaction product which is substantially adsorbed on an etching target, by contact with an etching gas. The outer part is formed of a material containing a component which is a main component of the etching target and ***causes such a reaction product as to be substantially adsorbed on the etching target by contact with an etching gas***, preferably, a metallic material.

Col. 10, line 65, to col. 11, line 2, states:

> A focus ring 208d of, e.g. amorphous carbon is situated on the support surface of the first susceptor 208a so as to surround the electrostatic chuck sheet 212 and wafer S, thereby efficiently radiating a generated plasma on the

> surface to be processed. The electrostatic chuck sheet comprises a pair of polyimide resin films 213 and 214, between which a thin conductive film 215 such as a copper foil is sealed. The conductive film 215 is connected to a DC power supply 217 via a conductive wire. A current is supplied from the DC power supply 217 so that the wafer S can be fixed on the susceptor by Coulomb force.

A reaction product that is ***substantially adsorbed on the etching target*** by contact with an etching gas (as Hasegawa et al describes) does **not** mean etching. Claim 1 of Hasegawa et al explains that:

> . . . produces such a reaction product as to be substantially adsorbed on the etching target by contact with said etching gas, so that said ***reaction product*** generated from said second surrounding surface ***diffuses to said major surface of said substrate*** while said plasma is being generated, thereby correcting a distribution of the amount of the reaction product on said major surface.

Thus, the "reaction" product in Hasegawa et al is a product to be reacted with the major surface of the substrate (i.e., to produce the etching of the substrate and a reacted product). If the "reaction" product had reacted on the outer ring or the inner ring, it would be consumed and would not therefore diffuse to "said major surface" as described in Hasegawa et al.

B. The Examiner's Answer incorrectly decides what the combined teachings of Hasegawa et al and Kumar et al would have a reasonable expectation of success

The Examiner's Answer incorrectly decides what the combined teachings of Hasegawa et al and Kumar et al would have suggested to those of ordinary skill in the art. The Examiner's Answer once gain concludes that a combination of Hasegawa et al and Kumar et al would have found a desirable result, with a reasonable expectation of success, of "releasing the active component of Kumar by erosion of the passive component of Kumar, to replace one or both of the focus rings 104, 106 of Figure 1 taught by Hasegawa or focus ring 208d of Figure 8 of Hasegawa with the ring comprising an active material embedded in a passive material as taught by Kumar."

Yet, as noted above, the focus rings of Hasegawa et al are not erodible components. Furthermore, Applicants point out below that all the descriptions in Kumar et al appear to be directed to the introduction of their plasma catalyst for the express purpose of plasma ignition. Kumar et al for example describe at col. 7 that:

> Consistent with this invention, a plasma apparatus may include a plasma catalyst that is located proximate to a plasma cavity. The catalyst can cooperate with the radiation to cause a gas to form a plasma. Also, as used herein, the phrase "proximate the cavity" means either within the cavity or at a location sufficiently close to the cavity to effect the formation of the plasma.

The Court in *Medichem S. A. v. Rolabo S. L.*, 437 F3d 1157, 77 USPQ2d 1865 (Fed. Cir. 2006) explained that:

> As stated above, an obviousness determination requires not only the existence of a motivation to combine elements from different prior art references, but also that a skilled artisan would have perceived a reasonable expectation of success in making the invention via that combination. While the definition of "reasonable expectation" is somewhat vague, our case law makes clear that it does not require a certainty of success. See In re O'Farrell, 853 F.2d 894, 903-04 (Fed. Cir. 1988) ("Obviousness does not require absolute predictability of success. . . . [A]ll that is required is a reasonable expectation of success.").
>
> However, to have a reasonable expectation of success, one must be motivated to do more than merely to "vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful." Id. at 903. Similarly, prior art fails to provide the requisite "reasonable expectation" of success where it teaches merely to pursue a "general approach that seemed to be a promising field of experimentation, where the prior art gave only general guidance as to the particular form of the claimed invention or how to achieve it." Id.

Here, the art of Kumar et al only provides general guidance for the introduction of their catalyst within the cavity or at a location sufficiently close to the cavity to effect the formation of the plasma. There would be a vast number of choices in the plasma chamber of Hasegawa et al which would meet this criterion.

Hence, with Hasegawa et al teaching a non-erodible focus ring and with Kumar et al only providing general guidance for the introduction of their catalyst within the cavity or at a location sufficiently close to the cavity, the Board will recognize that, under the *Medichem S. A. v. Rolabo S. L* standard, there is no reasonable expectation of success.

C. The Examiner's Answer has still provided no evidence to show that the erodible polymeric component of the combination of Hasegawa et al and Kumar et al would provide a benefit which would be expected to offset any corresponding loss in the active species used to etch the passive polymer to release the active component

In the Examiner's Answer on page 11, the Examiner once again postulates without evidence that:

> Moreover, the erodible polymeric component of the combination of Hasegawa et al and Kumar et al releases the active component into the plasma, which would be expected by one of ordinary skill in the art to provide a benefit of adding a desired chemical to the plasma, a benefit which would be expected ***to offset any corresponding loss in the active species*** used to etch the passive polymer to release the active component. [Emphasis added.]

In response, Applicants point out more specifically why the Examiner's position appears to be speculative and contrary to the facts of Hasegawa et al. Hasegawa et al state at col. 6, line 65, to col. 7, line 17, that:

> The outer part 106 is formed of a material having a main component, which is at least partially common to the material of a specific etching target. For example, when an electrically conductive film of W (tungsten) or WSi (tungsten silicide) for wiring is to be etched, it is desirable that the outer part 106 be formed of tungsten. Thus, the amount of a remaining reaction product per unit area is substantially equalized between a peripheral portion and a central portion of the wafer S during the etching process, and the in-plane uniformity of etching characteristics such as an etching rate, etching anisotropy, etc. is enhanced.
>
> As has been state above, the reaction product elimination rate differs between the peripheral portion and central portion of the wafer S due to the influence of a gas stream occurring within the process chamber 12 during the etching process. The reaction product is adsorbed on the surface of the etching object and functions as a temporary protection film or etching prevention film. Thus, the amount of the remaining reaction product per unit

> area is an important factor which determines the etching rate and etching anisotropy.

Hence, Hasegawa et al address a problem which occurs due to the influence of a gas stream occurring within the process chamber during the etching process and addresses this problem by equalizing the amount of a remaining reaction product per unit area between a peripheral portion and a central portion of the wafer.

It thus remains unclear the Examiner's basis for asserting that the benefit of adding a desired chemical to the plasma would be expected ***to offset any corresponding loss in the active species***, when Hasegawa et al shows that it is the amount of a remaining reaction product per unit area between a peripheral portion and a central portion of the wafer which is the critical effect for etching uniformity.

The PTO reviewing court has recently explained again the need for reliance on substantial evidence from the record in In re Gartside, 203 F.3d 1305, 1315 (Fed. Cir. 2000) ("Because our review of the Board's decision is confined to the factual record compiled by the Board ... the 'substantial evidence' standard is appropriate for our review of Board fact findings. *See* 5 U.S.C. §706(2)(E)."). Also note In re Zurko, 258 F.3d 1379, 1386, 59 USPQ2d 1693, 1698 (Fed. Cir. 2001) as follows:

> With respect to core factual findings in a determination of patentability, however, the Board cannot simply reach conclusions based on its own understanding or experience — or on its assessment of what would be basic knowledge or common sense. Rather, the Board must point to some concrete evidence in the record in support of these findings.

There is no evidence in the record to support the Examiner's position that the erodible polymeric component of the combination of Hasegawa et al and Kumar et al would provide a benefit ***which would be expected to offset any corresponding loss in the active species*** used to etch the passive polymer to release the active component.

D. The Examiner's Answer ignores Kava et al as rebuttal evidence.

Recent guidelines from the Patent Office regarding *KSR* published in Federal Register vol. 75, No. 169 (September 1, 2010) indicates at section five (5):

> 5. Federal Circuit Cases Discussing Consideration of Evidence. Office personnel should consider all rebuttal evidence that is timely presented by the applicants when reevaluating any obviousness determination. In the case of a claim rendered obvious by a combination of prior art references, applicants may submit evidence or argument to demonstrate that the results of the claimed combination were unexpected.
>
> Another area that has thus far remained consistent with pre- *KSR* precedent is the consideration of rebuttal evidence and secondary considerations in the determination of obviousness. As reflected in the MPEP, such evidence should not be considered simply for its "knockdown" value; rather, all evidence must be reweighed to determine whether the claims are nonobvious.
>
> Once the applicant has presented rebuttal evidence, Office personnel should reconsider any initial obviousness determination in view of the entire record. *See, e.g., In re Piasecki, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); In re Eli Lilly & Co., 90 F.2d 943, 945, 14 USPQ2d 1741, 1743 (Fed. Cir. 1990).* All the rejections of record and proposed rejections and their bases should be reviewed to confirm their continued viability.
>
> MPEP § 2141.
> Office personnel should not evaluate rebuttal evidence for its "knockdown" value against the *prima facie* case, *Piasecki, 745 F.2d at 1473, 223 USPQ at 788,* or summarily dismiss it as not compelling or insufficient. If the evidence is deemed insufficient to rebut the *prima facie* case of obviousness, Office personnel should specifically set forth the facts and reasoning that justify this conclusion.

Kava et al teach a textured focus ring surface which stabilizes and retains residues, not an erodible surface. In Kava et al, the focus ring is textured to maintain a coating on the surface of the focus ring. Kava et al states at col. 3, lines 14-19, that:

> Because a focus ring has proximity to the workpiece/surface substrate and, consequently, is more susceptible to contaminant build-up in plasma etch processing, it is desirable to provide a focus ring which accommodates and stabilizes coatings of contaminant residues and requires less frequency of cleaning.

Furthermore, Kava et al states at col. 7, lines 56-66, that:

> The above illustrations indicate that employing the texturized focus rings of the present invention will result in an improved contaminant control than otherwise obtainable with untexturized focus rings in that the uniform coating on the inner ring surface will more effectively prevent residue flaking onto a semiconductor workpiece during etch processing. Moreover, these rings will work more efficiently in that uniform coating of contaminant can be allowed to accumulate without contaminant risk to the workpiece and the texturized ring will require cleaning or replacement less often than ordinarily expected with an untexturized ring.

Thus, Kava et al is rebuttal evidence that **teaches away** from the claimed invention.

The Court in *In re Gurley*, 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994) stated that:

> A reference may be said to teach away when a person of ordinary skill, upon reading the reference, ***would be discouraged from following the path set out in the reference***, or ***would be led in a direction divergent from the path that was taken by the applicant.*** The degree of teaching away will of course depend on the particular facts; in general, a reference will teach away if it suggests that the line of development flowing from the reference's disclosure is unlikely to be productive of the result sought by the applicant. [Emphasis added.]

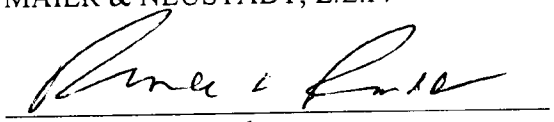
IV. Conclusion

Hence, for all these reasons given above, the Board should reverse the rejection under 35 U.S.C. § 103(a).

Indeed, Appellants request on the basis of the arguments presented above that the outstanding grounds for the rejection be reversed.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, L.L.P.



Steven P. Weihrouch
Attorney of Record
Registration No. 32,829

Ronald A. Rudder, Ph.D.
Registration No. 45,618